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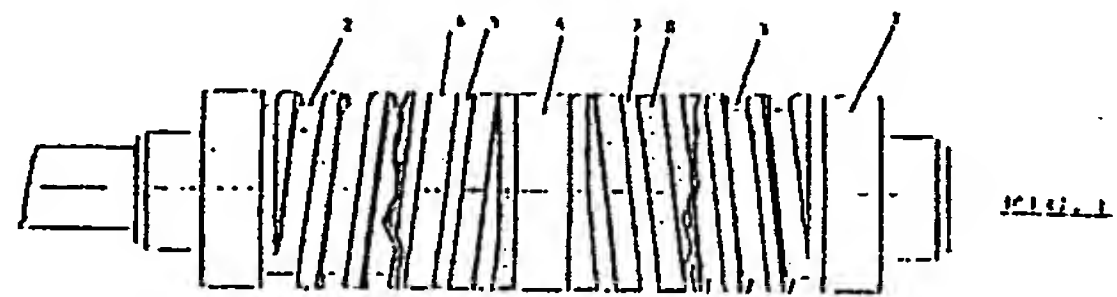
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54 **Conveying and folding cylinder for use in the paper and cardboard industry.**

57 A conveying and folding cylinder suitable for installation on machines for folding paper material having the side surface consisting of a metal part and of a part made from material with a high friction coefficient, such as rubber, wherein the metal part and the part with a high friction coefficient are arranged alternately in order to form on the surface two pairs of opposing helices each extending from the middle of said cylinder toward one of the ends.



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Description

CONVEYING AND FOLDING CYLINDER FOR USE IN THE PAPER AND CARDBOARD INDUSTRY

Field of the invention

The present invention relates to a conveying and folding cylinder for use in the paper and cardboard industry, suitable in particular for mounting on folding machines of the type commonly used in the graphic arts for folding printed sheets, or in office automation, of the type integrated in a line of equipment which is used for printing and folding, continuously and at a high speed, forms and documents so as to make them suitable, for example, for insertion into envelopes.

State of the Art

The cylinders for paper-sheet folding machines currently in use have a surface consisting of a metal part and of a part made of material with a high coefficient of friction consisting generally of rubber or elastomer. While the rubber part ensures conveying of the sheet passing between a pair of cylinders, the metal part enables clear and precise folding of the sheet to be obtained. In order to satisfy the various technical requirements, including those of a constructional nature, various arrangements of the metal part and the rubber part of the surface of the roller have been proposed: alternating circumferential strips, alternating helical strips, knurling, portions with a metal surface surrounded by a rubber surface and so on.

With particular reference to those cylinders whose surface consists of two continuous alternating metal and elastomeric strips extending helically, it has been found that using these cylinders does not allow paper material, in particular thin material, to be stretched properly at a high operating speed. This is due to a kind of drifting movement caused by the helical rotation of the opposing cylinders, which does not tension the passing sheet uniformly.

Summary of the Invention

The object of the present invention is to provide a cylinder for conveying and folding paper material, suitable for installation in folding machines and designed to exert a pulling force on the passing sheet both in the direction of forward movement and in the two opposite directions parallel to the axis of the cylinder.

The cylinder according to the invention is of the type in which its surface consists of a metal part and of a part with a high coefficient of friction, arranged alternately, and its innovative feature consists in the fact that the metal part and the part with a high coefficient of friction form on the surface of the cylinder two pairs of opposing helices each extending from the middle of said cylinder toward one of the ends.

Brief Description of the Drawings

The invention will now be described in greater detail in the description which follows of an exemplary and non-limiting embodiment thereof,

with reference to the accompanying drawings in which:

- Figure 1 shows a longitudinal and partially sectioned view of a folding cylinder according to the invention;
- Figure 2 shows a longitudinal view of a pair of cylinders according to the invention during operation;
- Figure 3 shows an end view of the cylinders shown in Figure 2.

Description of a preferred embodiment

With reference to Figure 1, 1 denotes a metal cylindrical body, on the side surface of which are formed two continuous grooves 2 and 3 extending helically and running in opposite directions, each covering one half of the side surface of the cylinder 1 between the middle 4 of the same cylinder and the two ends. The grooves 2 and 3 are formed by means of mechanical machining from a single piece, for example by means of turning.

The grooves 2 and 3 are filled with material with a high coefficient of friction, such as rubber, up to the level of the cylinder surface so that it is perfectly smooth, in this way, the cylindrical surface is formed by continuous helical metal and elastomeric strips, indicated by 5 and by 6, extending from one of its ends toward the middle 4 and of corresponding continuous helical metal and elastomeric strips, indicated by 7 and by 8, extending from its other end of the middle 4, but in the opposite direction.

Figures 2 and 3 illustrate how a pair of cylinders according to the invention operates. In these figures, the two cylinders are shown while a sheet of paper material 9 to be folded is passing between them. Coupling of the cylinders is performed so that during their rotation, in a clockwise and anticlockwise direction, respectively, the metal helical strips of one cylinder constantly correspond with the metal helical strips of the other cylinder, along the generatrix of contact of the cylinders. As illustrated in Figure 2, the sheet 9 passing between the two cylinders 1 performing a simultaneous rotating movement is stressed as indicated by the arrows, i.e. is subjected to a pulling action from the middle toward the ends, as a result of which the sheet is kept properly stretched while passing between the rollers and during the folding stage. The fact that paper materials, even those which are thin and of limited consistency, can be properly tensioned during conveying effected by the folding cylinders results in a higher operating speed and an improved fold and, in the special case of very thin paper, also the same possibility for folding.

As a result of the configuration of the folding cylinder according to the invention, the cylinder itself may be constructed as a single metal piece. This is advantageous in that operation at high speeds is possible without overheating of the rollers and the consequent consequent tensions which occur between metal and rubber adversely affecting function-

ing of the same rollers and their actual structure.

The invention is not limited to the embodiment described and illustrated above, but includes any variation of embodiment thereof.

Claims

1. A conveying and folding cylinder, in particular suitable for installation on machines for folding paper material, having the side surface consisting of a metal part and of a part made from material with a high coefficient of friction, in particular rubber, characterized in

that the metal part and the part with a high coefficient of friction are arranged alternately in order to form on said surface two pairs of opposing helices each extending from the middle of said cylinder toward one of the ends.

2. The cylinder as claimed in claim 1, comprising a cylindrical body, the surface of which is grooved by two opposing helical channels each extending from the middle of said cylinder toward one of the ends, the thickness of material with a high coefficient of friction within said grooves being equal to the depth of the same grooves.

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FIG. 1

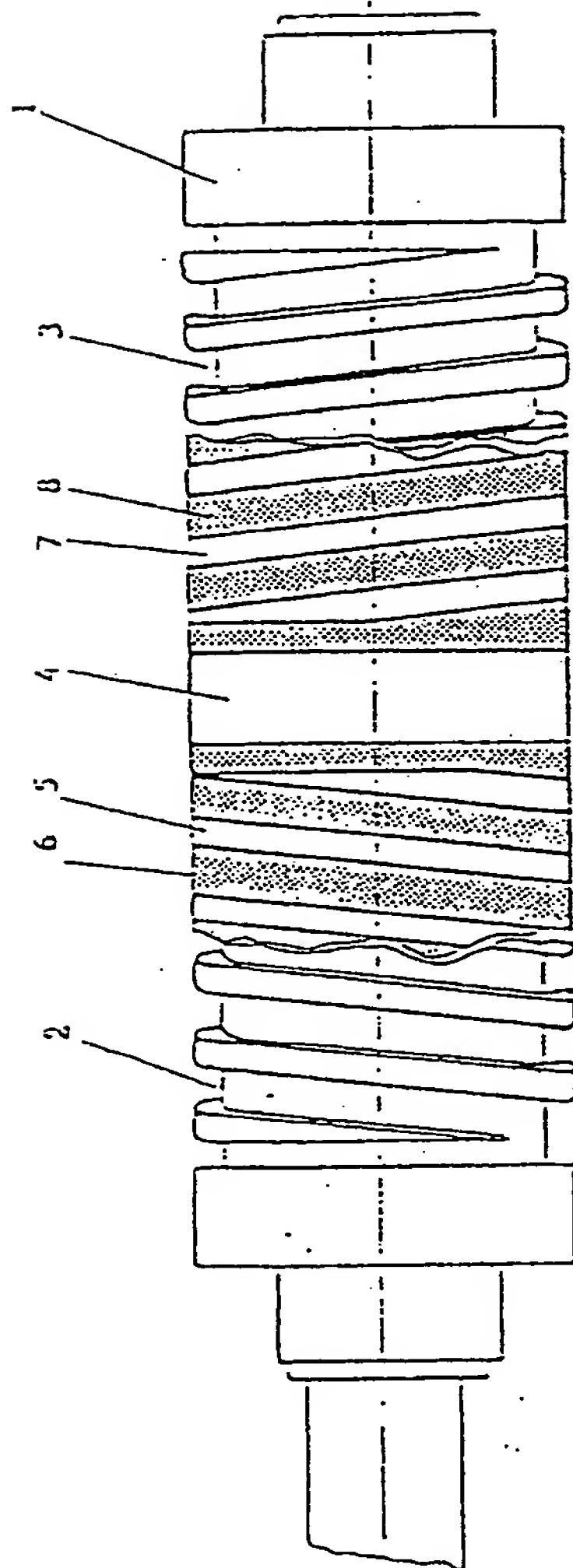


FIG. 3

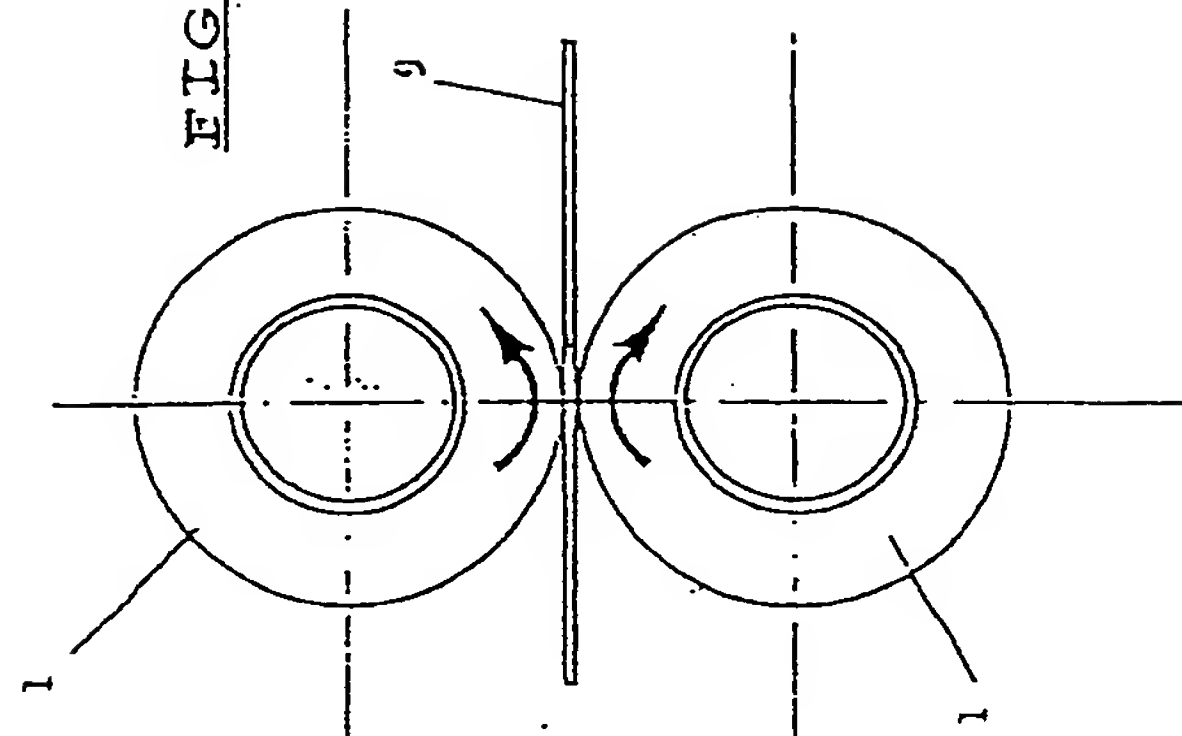
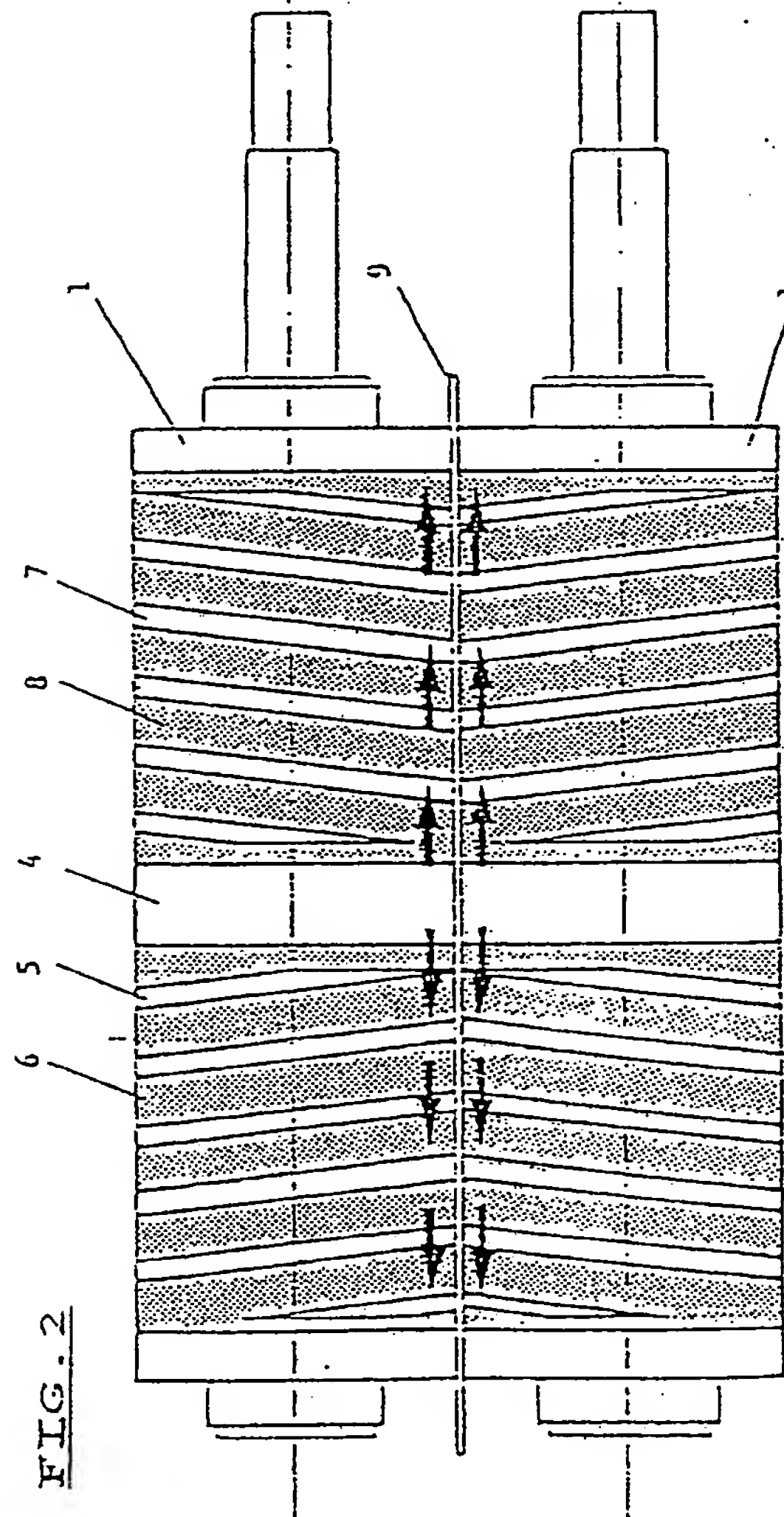


FIG. 2



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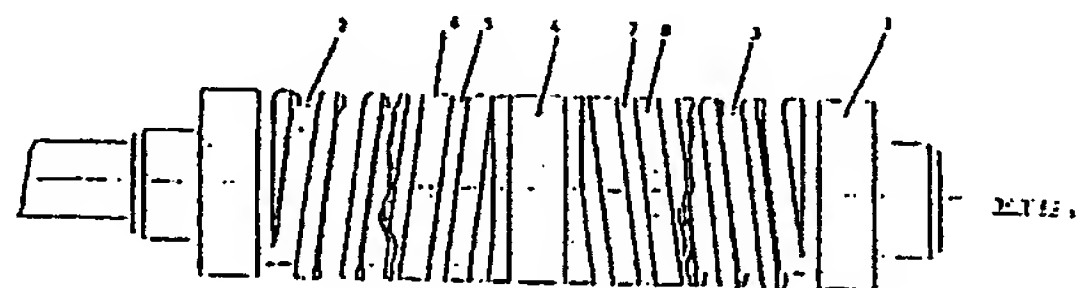
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. CL.4)
X	DE-B-1761741 (STAHL & CO MASCHINENFABRIK) * the whole document *	1-2	B65H23/025 B65H27/00
Y	DE-A-2302356 (MASCHINENBAU OPPENWEILER GMBH) * page 4, line 10 - page 5, line 4; figures 1-2 *	1-2	
Y	DE-B-1036031 (MAYER) * column 2, lines 34 - 40 * * column 3, line 24 - column 4, line 12; figure 1 *	1-2	
A	PATENT ABSTRACTS OF JAPAN vol. 9, no. 268 (M-424)(1991) 25 October 1985, & JP-A-60 112563 (CANON K.K.) 19 June 1985, * the whole document *	1-2	
			TECHNICAL FIELDS SEARCHED (Int. CL.4)
			B65H
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 22 JANUARY 1990	Examiner KOCH J. M. L.
CATEGORY OF CITED DOCUMENTS			
<p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application I : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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